U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Charpentiera densiflora*

COMMON NAME: Papala

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: July 2005

STATUS/ACTION:

___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

___ New candidate

_X__ Continuing candidate

___ Non-petitioned

_X__ Petitioned - Date petition received: May 11, 2004

__ 90-day positive - FR date:

_X_ 12-month warranted but precluded - FR date: May 11, 2005

_N_ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov).

___ Listing priority change

Former LP: ___

New LP: ___

Date when the species first became a Candidate (as currently defined): 1999

___ Candidate removal: Former LP: __

___ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Amaranthaceae (Amaranth family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

LAND OWNERSHIP: All populations are found on State land.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa_russell@fws.gov

BIOLOGICAL INFORMATION:

Species Description *Charpentiera densiflora* is a tree up to 12 meters (39 feet) tall, with brown tomentose new growth, and stems 4 to 9 millimeters (0.16 to 0.35 inches) in diameter below the apex. Leaves are coriaceous, elliptic to subovate, 13 to 40 centimeters (5 to 16 inches) long, 5.5 to 9.5 centimeters (2 to 4 inches) wide, with the marginal vein somewhat developed. Flowers are borne in branched panicles 22 to 48 centimeters (9 to 19 inches) long, with 20 to 100 flowers per branch. Seeds are 1 millimeter (0.04 inch) or less long. Individuals of this species become some of the largest known in the genus (Wagner *et al*. 1999a).

Taxonomy *Charpentiera densiflora* was described by Sohmer. This species is recognized as a distinct taxon in Wagner *et al*. (1999a) and Wagner and Herbst (2003), the most recently accepted Hawaiian plant taxonomy.

Habitat *Charpentiera densiflora* is found in *Diosporus sandwicensis* dominated lowland mesic forest, extending into diverse mesic forest, with rich brown soil with talus and leaf litter. It is found with the following associated native species: *Antidesma platyphyllum, Asplenium nidus, Carex meyenii, C. wahuensis, Diplazium sandwicianum, Doodia kunthiana, Hibiscus waimeae*

var. *hannerae*, *Metrosideros polymorpha*, *Myrsine* sp., *Pipturus* sp., *Pisonia* sp., *Pittosporum* sp., *Pleomele aurea*, *Pouteria sandwicensis*, *Psychotria mariniana*, *Pteralyxia sandwicensis*, *Rauvolfia sandiwcensis*, and *Tetraplasandra kavaiensis*, and at elevations between 152 to 671 meters (500 to 2,200 feet) (Hawaii Natural Heritage Program Database 2004; Ken Wood, National Tropical Botanical Garden, pers. comm. 1999).

Historical and Current Range/Current Status *Charpentiera densiflora* is known from 10 populations totaling approximately 200 individuals, restricted to an area of less than 26 square kilometers (10 square miles) in the Na Pali coast area on the island of Kauai (Wagner *et al*. 1999a; K. Wood, pers. comms. 1995 and 2004).

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.
This species is threatened by feral goats (*Capra hircus*) (K. Wood, pers. comm. 1995). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. Past and present activities of introduced alien mammals are the primary factor altering and degrading vegetation and habitats on Kauai. The goat, a species originally native to the Middle East and India, was successfully introduced to the Hawaiian Islands in 1792. Currently, populations exist on Kauai, Oahu, Maui, and Hawaii. On Kauai, feral goats have been present in drier, more rugged areas since the 1820s and they still occur in Waimea Canyon and along the Na Pali Coast, as well as in the drier perimeter of Alakai Swamp and even in its wetter areas during periods with low rainfall. Goats browse on introduced grasses and native plants, especially in drier and more open ecosystems. Feral goats eat native vegetation, trample roots and seedlings, cause erosion, and promote the invasion of alien plants. They are able to forage in extremely rugged terrain and have a high reproductive capacity (Clarke and Cuddihy 1980; van Riper and van Riper 1982; Scott *et al*. 1986; Tomich 1986; Culliney 1988; Cuddihy and Stone 1990). The original range of this taxon was probably much larger. The dry and mesic habitats of this taxon were damaged in the past by goats, and these effects are still apparent in the form of alien vegetation and erosion. This taxon continues to be threatened by direct damage from feral goats, such as trampling of plants and seedlings and erosion of substrate (Clarke and Cuddihy 1980; van Riper and van Riper 1982; Scott *et al*. 1986; Culliney 1988). Goat exclusion fences protect one of the ten known populations of this species; however, without continued monitoring and maintenance of those fences, pigs from surrounding areas can easily access fenced areas. In addition, the remaining, unfenced individuals of this taxon are still impacted by this threat.

B. Overutilization for commercial, recreational, scientific, or educational purposes.
None known.

C. Disease or predation.
None known.

D. The inadequacy of existing regulatory mechanisms.
Goats are managed in Hawaii as a game animal, but many herds populate inaccessible areas where hunting is difficult, if not impossible, and therefore has little effect on their numbers

(Hawaii Heritage Program 1990). Goat hunting is allowed year-round or during certain months, depending on the area (Hawaii Department of Land and Natural Resources n.d.-a, n.d.-b, n.d.-c, n.d.-d). However, public hunting does not adequately control the number of goats to eliminate this threat to *Charpentiera densiflora*. Goat exclusion fences protect one of the ten known populations of this species; however, without continued monitoring and maintenance of those fences, pigs from surrounding areas can easily access fenced areas. In addition, the remaining, unfenced individuals of this taxon are still impacted by this threat.

E. Other natural or manmade factors affecting its continued existence.
This species is threatened by flooding, which has increased in the area as a result of erosion caused by goats and from Hurricane Iniki in 1992 (K. Wood, pers. comm. 1995).

Non-native plant species are a threat to this species (K. Wood, pers. comm. 2004). Although the exact pest species that threaten this plant have not been identified, alien pest plants are found throughout the areas where this species occurs. The original native flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985; Wagner *et al*. 1999a). Several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux *et al*. 1998) indicate nonnative plant species may outcompete native plants similar to *Charpentiera densiflora*. Competition may be for space, light, water, or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Loope and Medeiros 1992; Medeiros *et al.* 1992; Ellshoff *et al.* 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al*. 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al*. 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to *Charpentiera densiflora*, the Service believes nonnative plant species are a threat to *Charpentiera densiflora*.

Nonnative plants are being controlled in one of the ten known populations of this species, but will probably never be completely eradicated because new propagules are constantly being dispersed into the fenced area from surrounding, unmanaged lands. Many widespread alien taxa cannot be completely eradicated from an island or the State, and therefore are expected to disperse into previously managed areas (Loope 1998, Smith 1985). The remaining populations of the species are still impacted by this threat.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED
The Service has provided funding through its Fish and Wildlife Coastal Programs to the Waipa Foundation, a non-profit, grassroots, community organization on Kauai, and work has begun on riparian and coastal restoration at four sites within Lumahai Valley. The riparian site(s) will provide protection to *Charpentiera densiflora* and other rare plants, through weed control and outplanting (The Nature Conservancy 2005).

This species is represented in an *ex situ* collection (U.S. Fish and Wildlife Service Controlled Propagation Database 2005).

SUMMARY OF THREATS:
The major threats to this taxon are goats and nonnative plant species, which are believed to be a major cause of the decline of this species throughout its range. Feral goats have been fenced out of one of the ten populations where *Charpentiera densiflora* currently occurs, and nonnative plants are being controlled there. These on-going conservation efforts for this species benefit only one of the ten known populations. The species as a whole is still impacted by these threats and will require long-term monitoring and management to maintain threat free areas. This species is represented in an *ex situ* collection.

LISTING PRIORITY:

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	**Imminent**	Monotypic genus	1
		Species	**2***
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:
Magnitude:
This species is highly threatened by goats that degrade and destroy habitat, flooding, and nonnative plants. Threats to the lowland and diverse mesic forest habitat of *Charpentiera densiflora* and to individuals of this species occur over most of its range, and are expected to continue or increase without their control or eradication. Feral goats have been fenced out of one of the ten populations where *Charpentiera densiflora* currently occurs, but the fences must be continually maintained to prevent incursion. Nonnative plants are being controlled in the fenced area. These on-going conservation efforts for this species benefit only one of the ten known populations. The species as a whole is still impacted by these threats and will require long-term monitoring and management to maintain threat free areas. This species is represented in an *ex situ* collection.

Imminence:
Threats to *Charpentiera densiflora* from goats and nonnative plants are imminent because they are ongoing in nine of the ten populations.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threat is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. *Charpentiera densiflora* is known from 10 populations totaling approximately 200 individuals in an area of approximately 10 square miles. This species is threatened by feral goats, flooding, and nonnative plants. The Service has funded riparian and coastal restoration at four sites on Kauai. These conservation actions will benefit *Charpentiera densiflora* and other rare plants on these sites. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *C. densiflora* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING:
Much of the information in this form is based on the results of a meeting of 20 botanical experts held by the Center for Plant Conservation in December of 1995, and was updated by personal communication with Ken Wood, National Tropical Botanical Garden, in 1995 and 1999. We have incorporated additional information on this species from our files and the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In 2004, the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art Medeiros, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical Botanical Garden. New information was provided by Ken Wood in 2004. In 2005 we contacted the species experts listed below and confirmation of the status of *Charpentiera densiflora* was provided by Steve Perlman.

The Hawaii Natural Heritage Program identified this species as critically imperiled (Hawaii Natural Heritage Program Database 2004). Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this species is recognized as Vulnerable (likely to be endangered unless threats to its survival are removed or reduced) by Wagner *et al*. (1999b).

One species expert provided new information confirming the status of the species this year and the results are included in this assessment.

COORDINATION WITH STATES:

In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or corrections (V. Caraway, pers. comm. 2005).

LITERATURE CITED

List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program
2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline
3. Jim Jacobi	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman*	March 29, 2005	National Tropical Botanical Garden
9. Ken Wood	June 28, 2005	National Tropical Botanical Garden
10. Marie Bruegmann	July 13, 2005	U.S. Fish and Wildlife Service
11. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife

*Provided new survey or status information on this taxon in 2005

List all databases searched:

Name	Date
1. Hawaii Natural Heritage Program	2004
2. U.S. Fish and Wildlife Service Controlled Propagation Database	2005

Other resources utilized:

Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.

Clarke, G., and L.W. Cuddihy. 1980. A botanical reconnaissance of the Na Pali coast trail: Kee Beach to Kalalau Valley (April 9-11, 1980). Division of Forestry and Wildlife, Department of Land and Natural Resources, Hilo, Hawaii.

Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation; effects of humans, their activities and introductions. Coop. Natl. Park Resources Stud. Unit, Hawaii. 138 pp.

Culliney, J.L. 1988. Islands in a Far Sea; Nature and Man in Hawaii. Sierra Club Books, San Francisco. 410 pp.

Ellshoff, Z.E., D.E. Gardner, C. Wikler, and C.W. Smith. 1995. Annotated bibliography of the genus *Psidium*, with emphasis on *P. cattleianum* (strawberry guava) and *P. guajava* (common guava), forest weeds in Hawai`i. Cooperative National Park Resources Studies Unit, University of Hawaii. Technical Report 95.

Hawaii, Department of Land and Natural Resources. N.d.-a. Summary of Title 13, Chapter 123,

Game mammal hunting rules, island of Oahu. Division of Forestry and Wildlife, Honolulu. 2 pp.
Hawaii, Department of Land and Natural Resources. N.d.-b. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Molokai. Division of Forestry and Wildlife, Honolulu. 2 pp.
Hawaii, Department of Land and Natural Resources. N.d.-c. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Maui. Division of Forestry and Wildlife, Honolulu. 2 pp.
Hawaii, Department of Land and Natural Resources. N.d.-d. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Kauai. Division of Forestry and Wildlife, Honolulu.
Hawaii Heritage Program, The Nature Conservancy of Hawaii. 1990. Management recommendations for Na Pali Coast State Park, island of Kauai. Unpublished report prepared for Hawaii, Department of Land and Natural Resources, Division of State Parks, Honolulu. 18 pp.
Loope, L.L. and A.C. Medeiros. 1992. A new and invasive grass on Maui. Newsletter of the Hawaiian Botanical Society 31: 7-8.
Loope, L.L. 1998. Hawaii and Pacific Islands. Pp. 747-774. In: M.J. Mac, P.A. Opler, C.E. Puckett Haecker, and P.D. Doran (eds.). Status and Trends of the Nation's Biological Resources, Volume 2. U.S. Department of the Interior, U.S. Geological Survey, Reston, VA.
Loope, L., F. Starr and K. Starr. 2004. Management and research for protecting endangered Hawaiian plant species from displacement by invasive plants on Maui, Hawaii. Weed Technology 18: 1472-1474.
Medeiros, A.C., L.L. Loope, P. Conant and S. McElvaney. 1997. Status, ecology, and management of the invasive plant, *Miconia calvescens* DC (Melastomataceae) in the Hawaiian Islands. Bishop Mus. Occas. Pap. 48: 23-36.
Medeiros, A.C., L.L. Loope, T. Flynn, S.J. Anderson, L.W. Cuddihy, and K.A. Wilson. 1992. Notes on the status of an invasive Australian tree fern (*Cyathea cooperi*) in Hawaiian rain forests. American Fern Journal 82: 27-33.
Meyer, J.-Y. and J. Florence. 1996. Tahiti's native flora endangered by the invasion of *Miconia calvescens* D.C. (Melastomataceae). Journal of Biogeography 23: 775-781.
Robichaux, R., J. Canfield, F. R. Warshauer, L. Perry, M. Bruegmann, and G. Carr. 1998. Adaptive Radiation. Endangered Species Bulletin. November/December.
Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: Their dynamics, ecology, and conservation. Studies in Avian Biology 9:1-429. Cooper Ornithological Society, Los Angeles.
Smathers, G.A. and D.E. Gardner. 1978. Stand analysis of an invading firetree (*Myrica faya* Aiton) population, Hawai`i. Proceeding of the Second Conference on Natural Science, Hawaii Volcanoes National Park, pp. 274-288.
Smith, C.W. 1985. Impact of alien plants on Hawai`i's native biota: *In* Stone, C.P., and J.M. Scott (eds.), Hawai`i's Terrestrial Ecosystems: Preservation and Management. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 180-250.
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van Riper, S.G., and C. van Riper III. 1982. A Field Guide to the Mammals in Hawaii. The Oriental Publishing Company, Honolulu. 68 pp.
Vitousek, P.M., C.M. D'Antonio, L.L. Loope, M. Rejnanek, and R. Westerbrooks. 1997. Introduced species: a significant component of human-caused global change. New Zealand Journal of Ecology 21(1): 1-16.
Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999a. Manual of the Flowering Plants of Hawai`i. University of Hawaii Press and Bishop Museum Press, Honolulu. Bishop Mus. Spec. Publ. 97: 1-1918.
Wagner, W.L., M.M. Bruegmann, and J.Q.C. Lau. 1999b. Hawaiian vascular plants at risk: 1999. Bishop Mus. Occas. Pap. 60: 1-58.
Wagner, W.L. and D.R. Herbst. 2003. Electronic supplement to the manual of flowering plants of Hawai‘i, version 3.1. December 12, 2003. Available from the Internet. URL: http://rathbun.si.edu/botany/pacificislandbiodiversity/hawaiianflora/supplement.htm.
Wenkam, R. 1969. Kauai and the Park Country of Hawaii. Sierra Club, San Francisco. 160 pp.
Wood, K.R. and S. Perlman. 1997. Maui 14 plant survey final report. Submitted by National Tropical Botanical Garden, October, 1997.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: Acting _____ 11/16/05
Regional Director, Fish and Wildlife Service Date

_____

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review: September 19, 2005
Conducted by: Marie M. Bruegmann, Pacific Islands FWO
Plant Recovery Coordinator

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: September 20, 2005
Plant Conservation Program Leader

Gina Shultz Date: October 17, 2005
Assistant Field Supervisor,
Endangered Species

Patrick Leonard Date: October 17, 2005
Field Supervisor